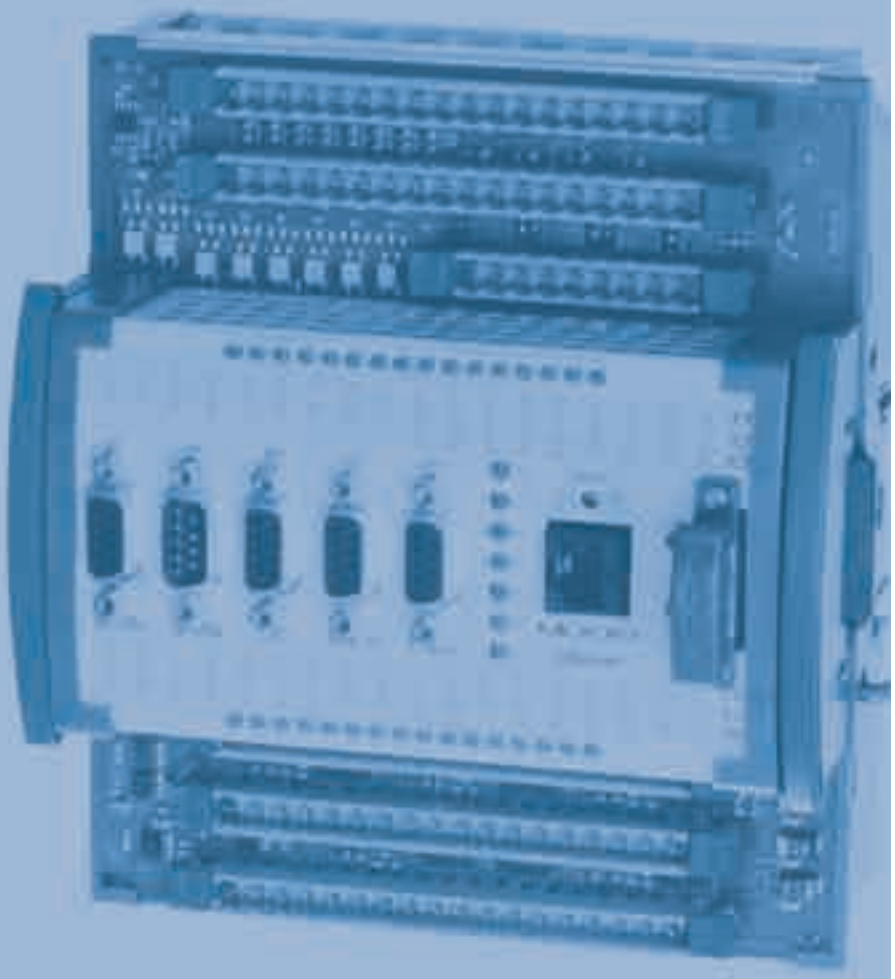
AUTOMATION SYSTEM
M3000



HIGH-PERFORMANCE
DIGITAL MOTION CONTROL SYSTEM FOR ELECTRIC AND HYDRAULIC DRIVES

WHAT MOVES YOUR WORLD

MOOG

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EXCELLENCE IN DRIVE TECHNOLOGY

For over 50 years Moog has ranked amongst the leading providers of drive technology with a focus on the production and application of high performance products. Today, Moog offers innovative products using state of the art control techniques that contribute to the performance improvement of machines.

Moog designs and manufactures products including servovalves, servo-proportional valves, pumps, integrated hydraulic manifold systems, servomotors and drives, motion controllers and electronics and electromechanical actuators.

Moog expertise and close collaboration with customers ensure solutions that meet today's toughest machine challenges – contact us!

Our Quality Management System conforms to DIN EN ISO 9001.

NOTICE

This catalog is for users with technical knowledge. To ensure that all necessary characteristics for function and safety of the system are covered, the user must check the suitability of the products described herein. Product descriptions provided herein are subject to changes that may be applied without prior notification. In case of doubt, please contact Moog.

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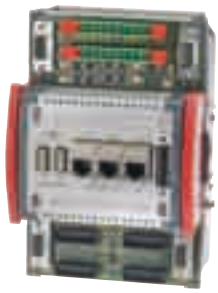
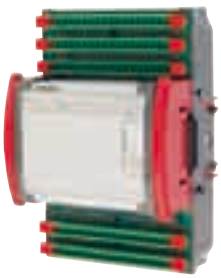
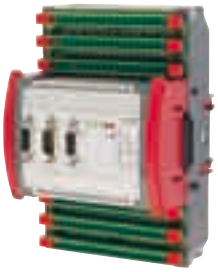
For the most current information, visit **www.moog.com/industrial**

Moog Servo Controller MSC	Moog Servo Controller MSC II	Moog Axis Control Software	Analog Module QAIO 2/2	Analog Module QAIO 16/4
				
Digital Module QDIO 16/16	**Extension Module QEBUS-CAN**	**Digital Extension Module RDIO 16/16**	**Operator Panel RDISP 22**	**Dialog Controller Display**
				

M3000 AUTOMATION SYSTEM

M3000 is Moog's digital motion control system, which offers high performance for hydraulic and electric drive products. This easy-to-use system offers rapid implementation and set-up to save users time and money.

M3000 Automation System

Programmable Multi-Axis Controller
- Moog Servo Controller (MSC)
- Extension Modules
- User Displays

Performance
- Cycle time for closed-loop axis control as fast as 100 microseconds
- Complex multi-axis (2 or more) motion control functions
- High performance closed-loop control functions designed by Moog experts

Integration
- Ethernet, USB, CAN bus, EIA/TIA 232 onboard
- Profibus-DP and EtherCAT optional
- Various sensor inputs (e.g. SSI, incremental encoder) plus analog and digital input/output
- Interface to multiple products, including Moog servodrives, servovalves, and pumps
- One easy-to-use software for all M3000 products called MACS
- All programming, debugging, simulation, parameterization, visualization, and tracing with one software tool

Software
- Moog Axis Control Software (MACS)
- Special function blocks for closed-loop control

Use of Standards
- User-friendly programming tool based on CoDeSys, IEC 61131-3
- All five IEC 61131-3 programming languages supported:
  - Function Block Diagram (FBD)
  - Instruction List (IL)
  - Sequential Function Chart (SFC)
  - Structured Text (ST)
  - Ladder Diagram (LD)
- Latest graphical programming language for easy closed-loop design Continuous Function Chart (CFC)
- Standard protocols: CANopen, TCP/IP, DDE, OPC
- A CoDeSys Automation Alliance (CAA) certified product
- Motion control functions according to PLCopen standard

Components
- Servomotors and Servodrives
- Servovalves
- Servo-Proportional Valves
- Radial Piston Pumps RKP

Scope of Supply and Services
- Primary Feature: High Performance Motion Control
- Plus: PLC Automation Solutions
- Plus: Electric Motion Systems
- Plus: Hydraulic Motion Systems
- Plus: Training & Global Support of System Solutions
- Plus: Easy and Quick Implementation

MOOG SERVO CONTROLLER

MSC

BRIEF DESCRIPTION

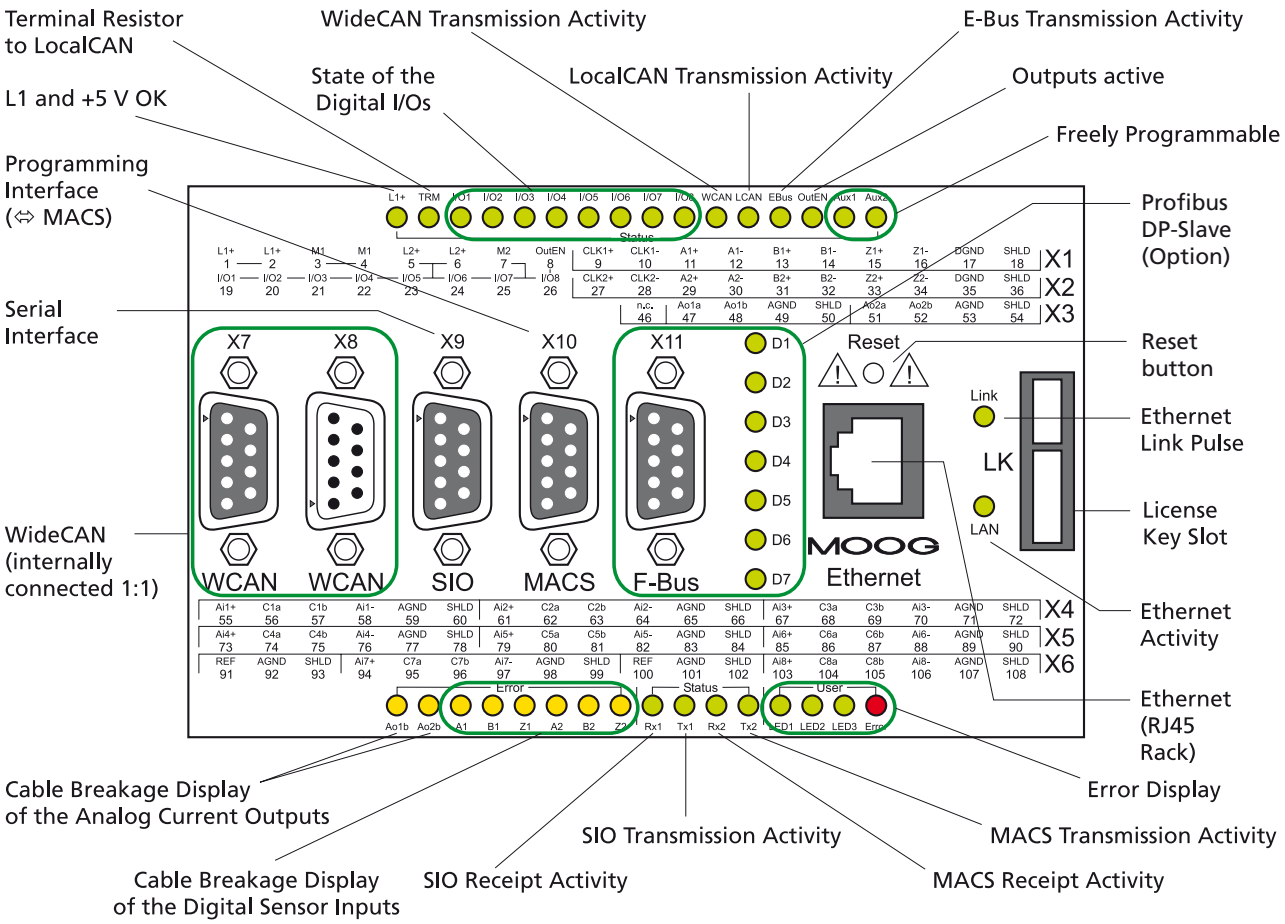
MOOG SERVO CONTROLLER MSC

- Freely programmable multi-axis controller
- Programming with IEC 61131 development environment MACS (Moog Axis Control Software)
- Integrated PLC functionality
- Realization of fast and precise controls (e.g. for position, speed and force)
- Suitable for electrical and hydraulic drives
- Freely definable controller structures with cycle times from 400 µs
- Hardware functionality can be parameterized via MACS software
- PowerPC-based processor
- Memory: 4 MB RAM; 4 MB Flash EEPROM

FEATURES

- Tool-free assembly on DIN top-hat rail mounting
- Simple wiring with terminal strips
- Sustained short circuit protection for analog and digital outputs
- Overvoltage protection up to ±36 V of analog inputs and outputs
- No parts subject to wear, no jumpers, no battery or rechargeable battery
- LEDs for status and error display
- Wire fault monitoring for all digital sensor inputs and analog current outputs
- Additional digital or analog inputs and outputs with M3000 extension modules
- Simple connection of the M3000 modules via extension bus (E-bus)
- Profibus-DP slave as option

OVERVIEW: INTERFACES, CONNECTIONS AND LED'S

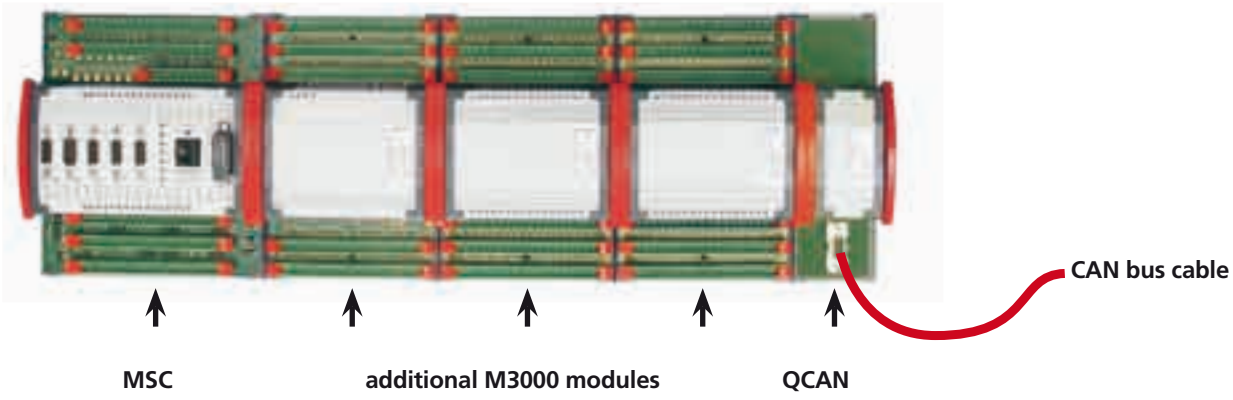


SET-UP

LOCAL EXTENSION POSSIBILITIES WITH M3000 MODULES VIA E-BUS

- Up to 7 additional M3000 modules can be connected to the extension bus (E-bus) of the MSC
- M3000 modules are put together and locked on the top-hat rail. The E-bus connection is simply and reliably built via the side connectors
- In this way, further digital and/or analog inputs and outputs can be added as required
- The control and signal processing is done by the MSC. The connected extension modules do not require their own intelligence

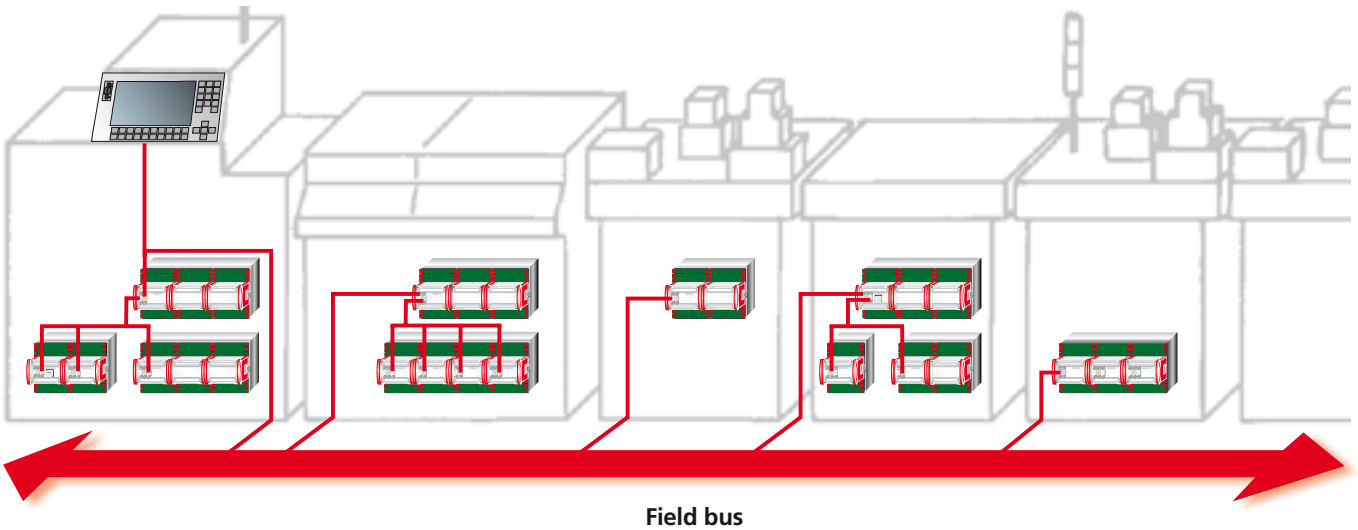
ARRANGEMENT OF M3000 MODULES VIA E-BUS



DECENTRALIZED SET-UP

- Additional M3000 modules can be independently networked via the CAN bus
- Extension modules can also be connected to each decentralized Moog Servo Controller MSC
- In addition, M3000 remote modules (e.g. displays, digital inputs/outputs) can also be connected via the CAN bus
- Further components with CAN or CANopen interfaces can be networked. For this, Moog provides an extensive selection of motor controllers, hydraulic valves and radial piston pumps
- This enables a flexible set-up of automatic solutions
- Further details can be found in the relevant catalogs

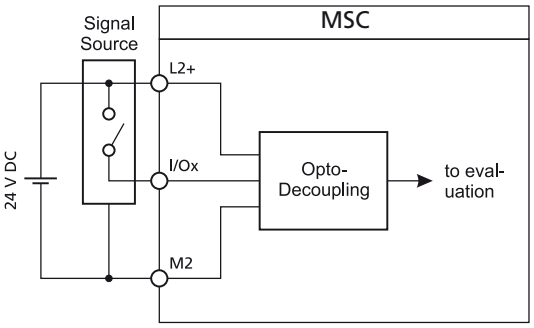
ARRANGEMENT OF M3000 MODULES VIA FIELD BUS



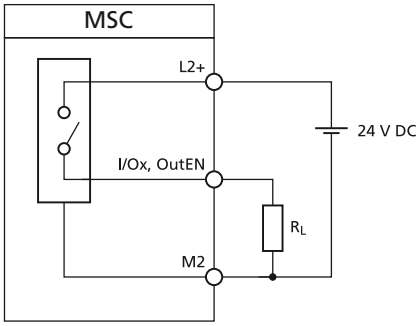
INPUTS/OUTPUTS BASIC CIRCUIT DIAGRAMS

Digital Inputs/Outputs	
Voltage supply of the digital I/O	24 V DC (18-36 V DC) SELV pursuant to DIN EN 60950-1
Current consumption of the digital I/O	0.3 A in idling; all digital outputs active: 4 A
8 digital inputs and outputs	Individually configurable in MACS as input or output. Inputs: type 1 (current-consuming) pursuant to IEC 61131-2 Outputs: max. 0.5 A Sustained short-circuit protection, thermal overload protection
Watchdog output: “Outputs enabled“ signal	Analog and digital outputs in operation In the event of a fault, the watchdog output goes to a high impedance state

DIGITAL INPUT

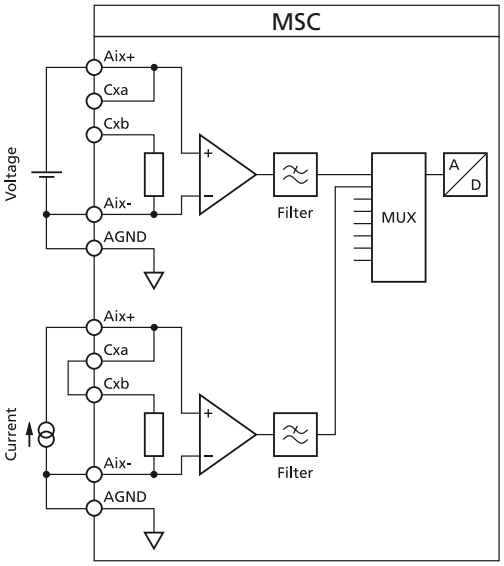


DIGITAL OUTPUT

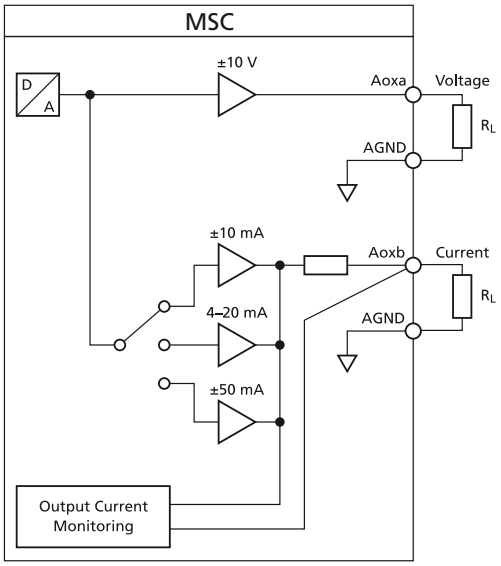


Analog Inputs/Outputs	
Voltage supply to analog I/O	Via internal DC/DC converter
8 analog inputs	16 Bit; individually configurable in the MACS software as ±10 V, ±10 mA or 4–20 mA; overvoltage protection up to ±36 V
2 analog outputs	16 Bit; each ±10 V, additionally individually configurable in the MACS software as ±10 mA, ±50 mA or 4–20 mA Overvoltage protection up to ±36 V; short-circuit protected

ANALOG INPUT (CURRENT/VOLTAGE)



ANALOG OUTPUT (CURRENT/VOLTAGE)

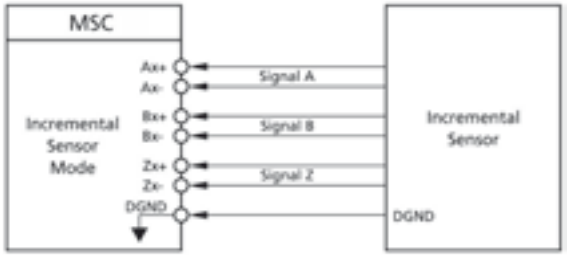


SENSOR INTERFACES DIMENSIONS

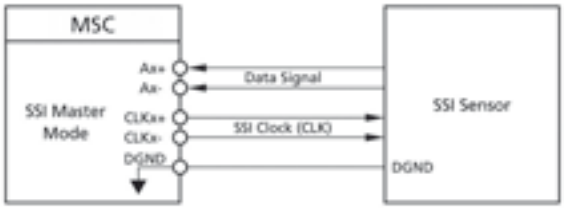
Reference for Sensors	
Reference voltage output	+10 V; can bear up to max. 5 mA overvoltage protection up to ±36 V; short-circuit protected

Sensor Interfaces	
2 Sensor interfaces each configurable as a) Incremental encoder b) SSI transmitter	Signals corresponding to TIA/EIA 422 (previously RS 422) Wire fault monitoring of inputs Configurable in MACS software: a) Incremental encoder four-edge evaluation, max. pulse frequency 8 MHz b) SSI sensor master or slave data format: gray code or binary; data bits 8 to 32 Bit transmission frequency: 78 kHz to 5 MHz

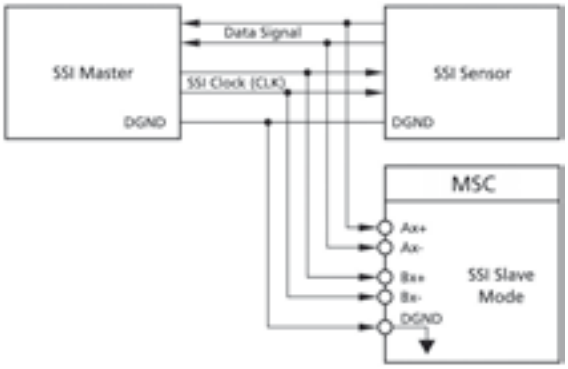
INCREMENTAL ENCODER



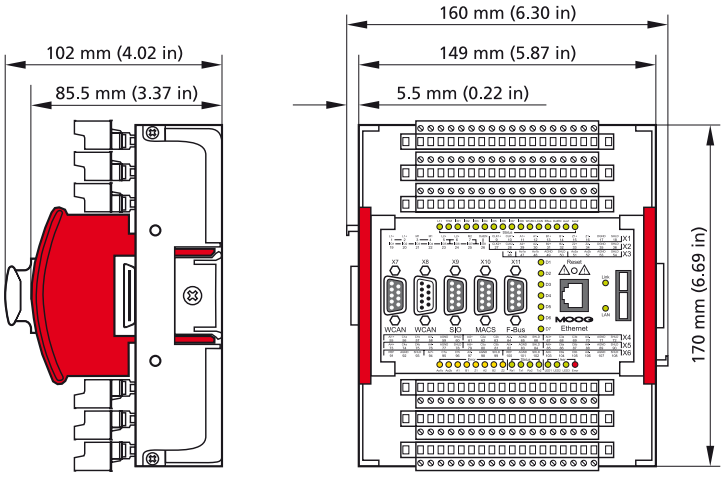
SSI MASTER



SSI SLAVE



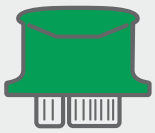
DIMENSIONS



ACCESSORIES

LICENSE KEY
(One license key is needed per MSC)

The license key contains the runtime license for the MSC. According to the license key used, additional functionality of the MACS software is enabled for usage.

Designation	Scope of Functions	Order number
Controls (Color: Grey) 	• MACS runtime license for application program to DIN EN 60950-1 • CoDeSys operators and standard IEC 61131 library • MSC hardware library • Moog control technique library • Interface library for TIA/EIA 232 and CAN bus • Support for OPC and DDE interfaces • Ethernet communication to MACS development environment	D138-002-001
Motion (Color: green) 	All functions of "Controls" and additionally: • Motion control library according to PLCopen • Moog motion control function blocks • Library with transfer functions (Z functions) • CANopen and TCP/IP libraries • Profibus DP slave (depending on hardware option)	D138-002-002
System (Color: red) 	Program parts and/or complete application programs, produced specifically upon customer's request	Is stipulated specific to the order

Accessories Plug-in terminal strips (five 18-pole and one 9-pole are needed per module)		
Designation	**Description**	**Order number**
Screw terminal, 18-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	VK055-018
Screw terminal, 9-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	VK055-009
Spring-power clamp, 18-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	B95907-018
Spring-power clamp, 9-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	B95907-009

TECHNICAL DATA

Module Data	Digital Control Module
Designation	Moog Servo Controller MSC
Order number	D136-001-008 MSC D136-001-007 MSC with Profibus-DP slave interface
Connection technique	Plug-in terminal strips for screwing or clamping
Assembly	NS 35/7.5 mounting rail pursuant to EN 50022 (DIN top-hat rail)
Dimensions W x D x H (mm)	160 x 170 x 85.5 (attachment dimension: W = 149/154.5)
Temperature range	+5 °C (+41 °F) to 55 °C (+131 °F) (operation) and -25 °C (-13 °F) to +70 °C (+158 °F) (storage) Mean temperature in operation for 24 hrs.: max. +50°C (+122°F)
Relative air humidity	10 % to 95 % (non-condensing)
Operation height	Max. 2000 m (6500 feet); storage/transport max. 3000 m (9800 feet)
Processor	PowerPC Processor, 32 Bit, RISC architecture with floating point unit
Memory	4 MB Flash EEPROM; data maintenance: typically 10 years

Standards	
Operating equipment demands and examinations	IEC 61131-2
Interference emission / immunity	EN 61000-6-4 / EN 61000-6-2, industrial part
Shock / vibration	IEC 60068 part 2-27 / IEC 60068 part 2-6
Protection class / protection system	III / IP20
Insulation strength	IEC 61131-2; test voltage 500 V DC

Energy Supply	
Voltage supply of module electronics	24 V DC (18-36 V DC) SELV pursuant to DIN EN 60950-1
Current consumption of module electronics	0.5 A / 2 A (idling / full load)
Potential separation	Separate potentials for: module electronics, 24 V supply, digital inputs/outputs, Ethernet
Internal voltages	Generated via internal DC/DC converters
Behavior at voltage failures/ cut-off of supply voltage	Necessary data are permanently stored (Flash EEPROM, data maintenance typically 10 years). If the supply voltage fails (<18 V), buffer capacitors provide the necessary energy

Interfaces	
Ethernet (10BaseT)	10 MBit/s with 8-pole RJ45 connection
2 independent CAN interfaces "WCAN" LocalCAN	Transmission rate adjustable, 10 kBit/s to 1 MBit/s WideCAN: 2 D-Sub "WCAN" connectors on the front cover (are connected internally 1:1) LocalCAN: in the side Q-connectors
Profibus-DP slave (option)	Transmission rate up to 12 MBit/s
"MACS" on front cover (TIA/EIA 232)	Communication with the MACS software on the PC
"SIO" on front cover (TIA/EIA 232)	For free use in the application program
Extension bus (E-bus)	Q-connectors on right and left of module for connecting up to 7 additional M3000 modules Contains a serial bus (5 to 10 MBit/s) and the LocalCAN bus

BRIEF DESCRIPTION

MOOG SERVO CONTROLLER (MSC II)

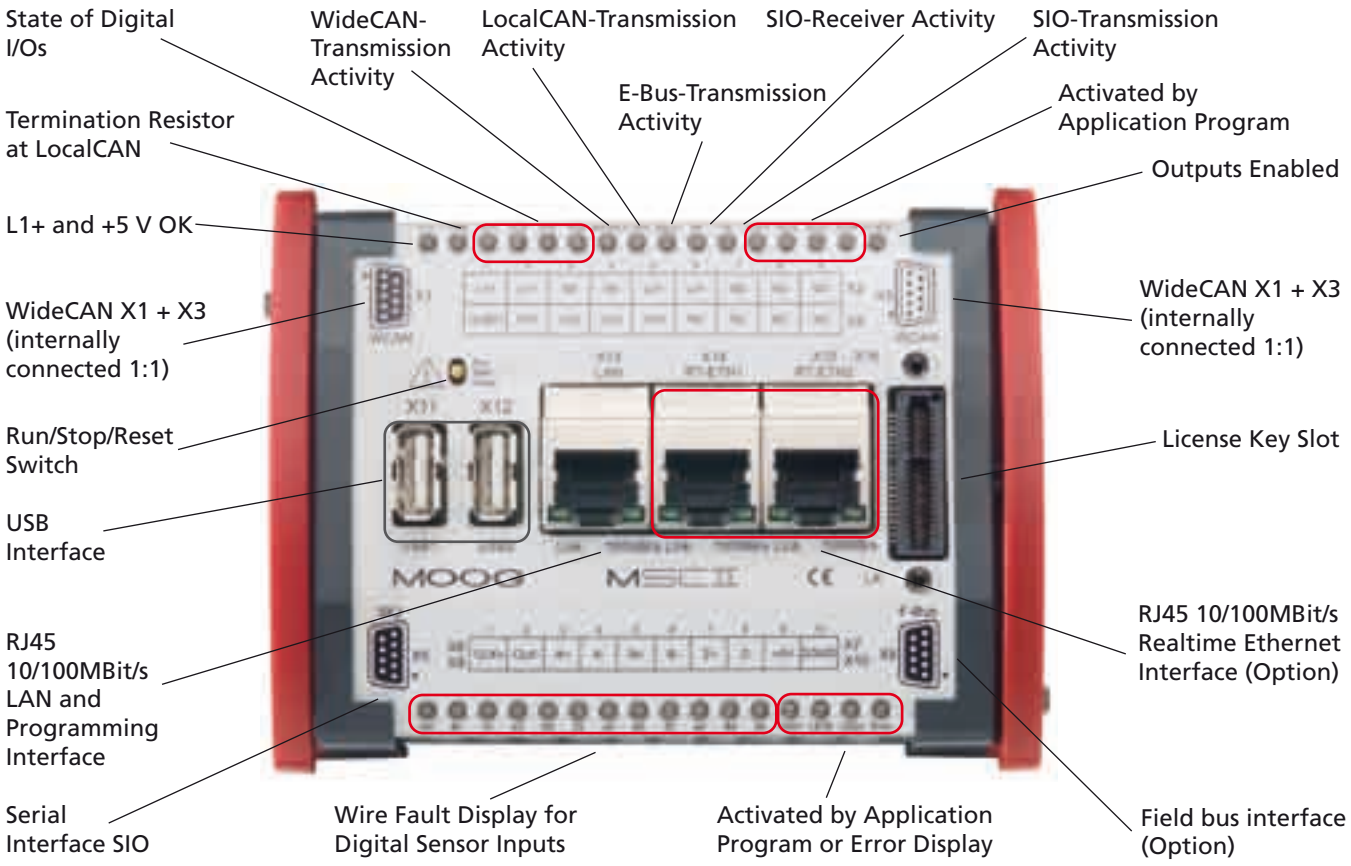
The MSC II is a freely programmable multi-axis controller that facilitates rapid and precise control of process variables such as position, speed, and power. It is suitable for use with both electric and hydraulic drives.
MSC II is offered in addition to MSC. Compared to the MSC it offers higher computation power, shorter cycle times and additional field bus options, such as EtherCAT.

The MSC II does not include analog inputs and outputs. The analog extension modules QAIO 16/4 or QAIO 2/2 are recommended for applications where analog inputs and outputs are required.

FEATURES

- Freely programmable multi-axis motion controller
- Freely definable controller structures with cycle times from 100 µs
- Very low jitter (variation of time base) for optimum closed loop accuracy
- Programming with IEC 61131 development environment MACS (Moog Axis Control Software)
- Integrated PLC functionality
- Hardware functionality can be parameterized via MACS software
- Tool-free assembly on DIN top-hat rail
- Simple wiring with terminal strips
- Sustained short circuit protection for digital outputs
- No parts subject to wear, no jumpers, no battery or rechargeable battery
- LEDs for status and error display
- Wire fault monitoring for all digital sensor inputs
- Additional digital or analog inputs and outputs with M3000 extension modules
- EtherCAT Realtime Ethernet interface as option
- Profibus-DP slave as option

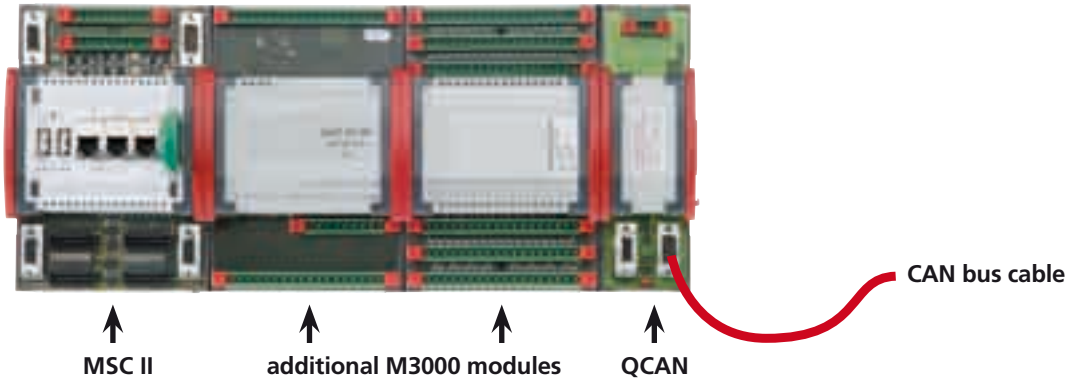
OVERVIEW: INTERFACES, CONNECTIONS AND LED'S


State of Digital I/Os
WideCAN-Transmission Activity
LocalCAN-Transmission Activity
SIO-Receiver Activity
SIO-Transmission Activity
E-Bus-Transmission Activity
Activated by Application Program
Termination Resistor at LocalCAN
Outputs Enabled
L1+ and +5 V OK
WideCAN X1 + X3 (internally connected 1:1)
WideCAN X1 + X3 (internally connected 1:1)
Run/Stop/Reset Switch
License Key Slot
USB Interface
RJ45 10/100MBit/s Realtime Ethernet Interface (Option)
RJ45 10/100MBit/s LAN and Programming Interface
Serial Interface SIO
Wire Fault Display for Digital Sensor Inputs
Activated by Application Program or Error Display
Field bus interface (Option)

LOCAL EXTENSION POSSIBILITIES WITH M3000 MODULES VIA E-BUS

- Up to 7 additional M3000 extension modules can be connected to the extension bus (E-bus) of the MSC II
- M3000 modules are put together and locked on the top-hat rail. The E-bus connection is simply and reliably built via the side connectors
- In this way, further digital and/or analog inputs and outputs can be added as required
- The control and signal processing is done by the MSC II. The connected extension modules do not require their own intelligence

ARRANGEMENT OF M3000 MODULES VIA E-BUS



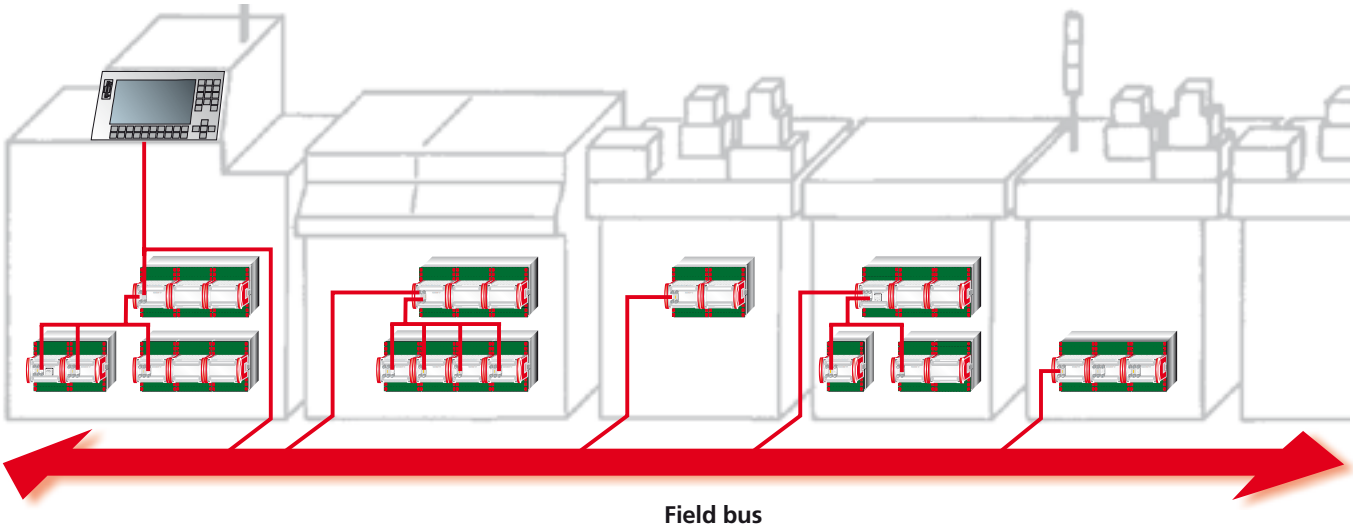
DECENTRALIZED SET-UP

Additional M3000 modules can be independently networked:

- M3000 extension modules: With analog I/Os and digital I/Os
- M3000 remote modules (e.g. displays, digital inputs/ outputs)
- Electrical servo drives (MSD Servo Controllers)
- Servo and proportional valves with digital interface like Moog DIV (Digital Interface Valve), Moog ACV (Axis Control Valve)
- Pumps with digital interface (Moog RKP-D Radial Piston Pumps)

This enables a flexible set-up of automation solutions. Further details can be found in the relevant catalogs.

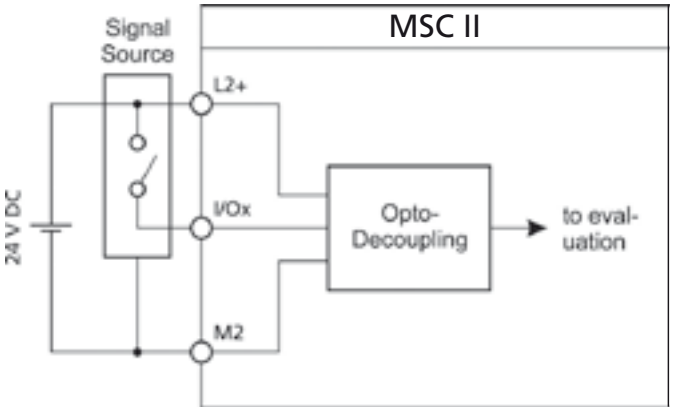
ARRANGEMENT OF M3000 MODULES VIA FIELD BUS



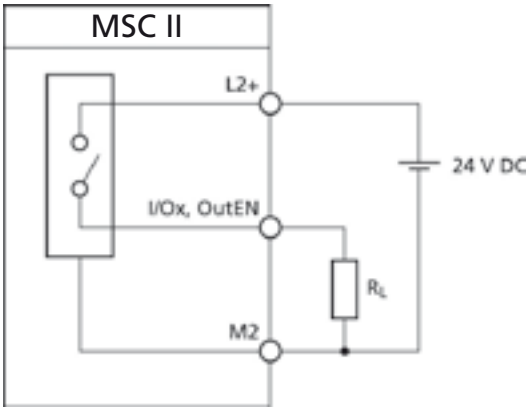
INPUTS/OUTPUTS BASIC CIRCUIT DIAGRAMS

Digital Inputs/Outputs	
Voltage supply of the digital I/O	24 V DC (18-36 V DC) SELV pursuant to DIN EN 60950-1
Current consumption of the digital I/O	0.3 A in idling; all digital outputs active: 2 A
4 digital inputs and outputs	Individually configurable in MACS as input or output Inputs: type 2 (current-consuming) pursuant to IEC 61131-2 Outputs: max. 0.5 A Sustained short-circuit protected, thermal overload protection
Watchdog output: "Outputs enabled" signal	Outputs in operation. In the event of a fault, the watchdog output goes to a high impedance state

DIGITAL INPUT



DIGITAL OUTPUT



SENSOR INTERFACES DIMENSIONS

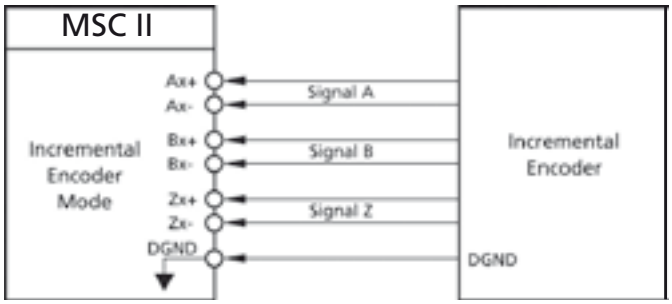
SENSOR INTERFACES

4 Sensor interfaces each configurable as
a) Incremental encoder
- Standard
- Pulse train
- Frequency measurement

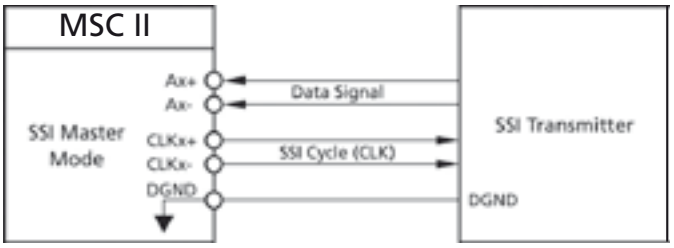
b) SSI transmitter

Signals corresponding to TIA/EIA 422 (previously RS 422) with protection against 24 Volt. Wire fault monitoring of inputs. Configurable in MACS software:
a) Incremental encoder
four-edge evaluation, max. pulse frequency 8 MHz
b) SSI sensor master or slave data format: gray or binary code; data bits 8 to 32 Bit;
transmission frequency: 78 kHz to 5 MHz

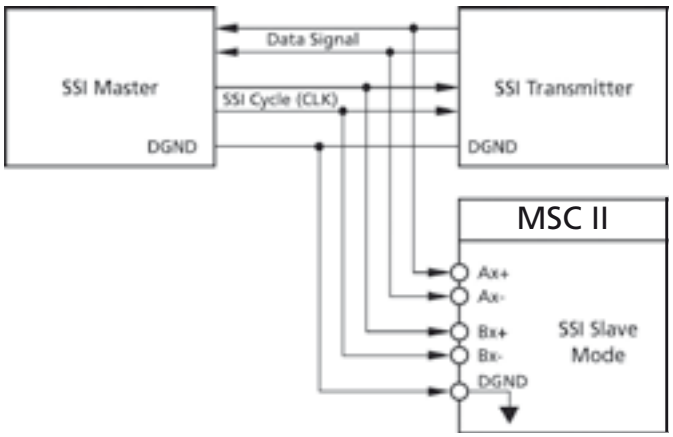
INCREMENTAL ENCODER



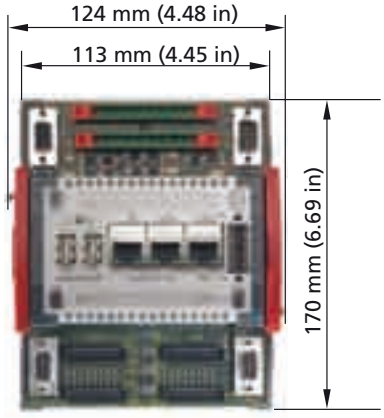
SSI MASTER



SSI SLAVE



DIMENSIONS



Height:
- 85.5 mm (3.37 in) without License Key
- 102 mm (4.02 in) with License Key

ACCESSORIES

LICENSE KEY
(One license key is needed per MSC II)

The license key contains the runtime license for the MSC II. According to the license key used, additional functionality of the MACS software is enabled for usage.

Designation	Scope of Functions	Order number
Controls (Color: Grey) 	MACS runtime license for application program • CoDeSys operators and standard IEC 61131 library • MSC II hardware library • Moog control technique library • Interface library for TIA/EIA 232 and CAN bus • Support for OPC and DDE interfaces • Ethernet communication to MACS development environment	D138-002-001
Motion (Color: green) 	All functions of "Controls" and additionally: • Motion control library according to PLCopen • Moog motion control function blocks • Library with transfer functions (Z functions) • CANopen and TCP/IP libraries • Profibus-DP slave (depending on hardware option) • EtherCAT master (depending on hardware option)	D138-002-002
System (Color: red) 	Program parts and/or complete application programs, produced specifically upon customers request	Is stipulated specific to the order

Accessories Plug-in terminal strips (four 10-pole and two 9-pole are needed per module)		
Designation	**Description**	**Order number**
Screw terminal, 9-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	VK055-009
Spring-power clamp, 9-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	B95907-009
Spring-power clamp, 10-pole	Up to max. conductor cross-section of 0.5 mm² (20 AWG)	CA45260-010

TECHNICAL DATA

Module Data	Digital Control Module
Designation	Moog Servo Controller II (MSC II)
Order number	D136-002-002 MSC II D136-002-001 MSC II : As D136-002-002 but additional Profibus-DP interface D136-002-003 MSC II : As D136-002-002 but additional dual EtherCAT Master interface
Connection technique	Plug-in terminal strips for screwing or clamping
Assembly	NS 35/7.5 mounting rail pursuant to EN 50022 (DIN top-hat rail)
Dimensions W x D x H (mm)	124 × 170 × 85.5 (attachment dimension: W = 113 / 118.5)
Temperature range	+5 °C (+41 °F) to 55 °C (+131 °F) (operation) and -25 °C (-13 °F) to +70 °C (+158 °F) (storage) Mean temperature in operation for 24 hrs.: Max. +50 °C (+122 °F)
Relative air humidity	10 % to 95 % (non-condensing)
Operation height	Max. 2000 m (6500 feet); storage/transport max. 3000 m (9800 feet)
Processor	PowerPC Processor, 32 Bit, RISC architecture with floating point unit
Memory	128 MB RAM, 32 MB Flash EEPROM; data maintenance: typically 10 years

Standards	
Operating equipment demands and examinations	IEC 61131-2
Interference emission / immunity	EN 61000-6-4 / EN 61000-6-2, industrial part
Shock / vibration	IEC 60068 part 2-27 / IEC 60068 part 2-6
Protection class / protection system	III / IP20
Insulation strength	IEC 61131-2; test voltage 500 V DC

Energy Supply	
Voltage supply of module electronics	24 V DC (18-36 V DC) SELV pursuant to DIN EN 60950-1
Current consumption of module electronics	0.5 A / 2 A (idling / full load)
Potential separation	Separate potentials for: Module electronics, 24 V supply, digital inputs/outputs, Ethernet
Internal voltages	Generated via internal DC/DC converters
Behavior at voltage failures / cut-off of supply voltage	Necessary data are permanently stored (Flash EEPROM, data maintenance typically 10 years)

Interfaces	
Ethernet (100BaseT)	100 MBit/s with 8-pole RJ45 connection
EtherCAT (optional)	Dual EtherCAT Master Interface, Slave in preparation
Profibus-DP slave (optional)	Transmission rate adjustable up to 12 MBit/s
2 independent CAN interfaces "WCAN" "LCAN"	Transmission rate adjustable, 10 kBit/s to 1 MBit/s WCAN: 2 D-Sub "WCAN" connectors on the front cover (are connected internally 1:1) LCAN: in the side Q-connectors
2 USB 1.1 interfaces	Host interface(s) via USB-A connector
"SIO" on front cover (TIA/EIA 232)	For free use in the application program
Extension bus (E-bus)	Q-connectors on right and left of module for connecting up to 7 additional M3000 modules Contains a serial bus (5 to 10 MBit/s) and the LCAN bus

MOOG AXIS CONTROL SOFTWARE

MACS

BRIEF DESCRIPTION

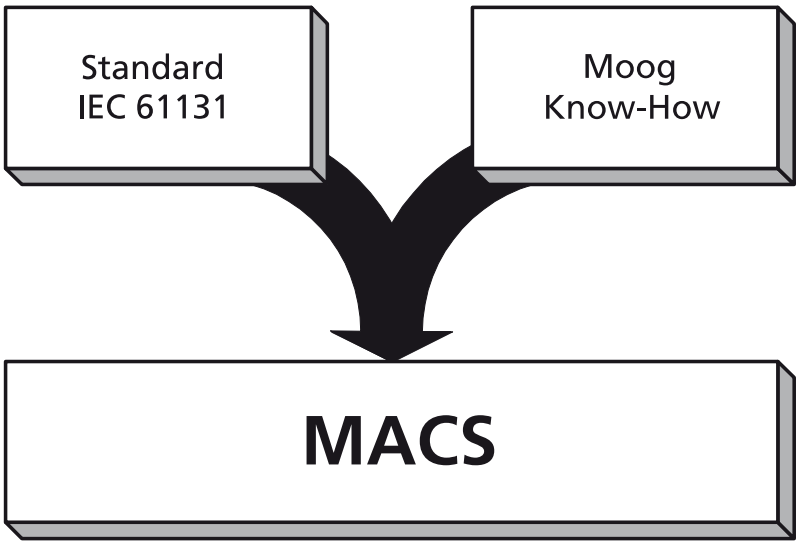
GENERAL

The Moog Axis Control Software (MACS) offers a state-of-the-art development environment for solving demanding control tasks on the basis of the IEC 61131 standard.

MACS includes tools for:
- Programming
- Testing and optimizing
- Debugging
- Documentation
- Visualization
- Configuration

FEATURES

- Extensive libraries with Moog function blocks, based on 50 years of experience in electric and hydraulic drive engineering
- Freely programmable controller structures
- Maximum flexibility by a complete scope of functions in all IEC 61131 programming languages
- Simultaneous realization of control, regulation and PLC applications in one application program
- Open standard interfaces for communication on machine and process guidance levels
- Motion control functions corresponding to PLCopen standard



INTERFACES

Process guidance level:
- OPC server
- DDE interface

Machine level:
- CAN
- CANopen
- Ethernet TCP/IP
- Profibus DP
- TIA/EIA 232
- EtherCAT

YOUR BENEFITS

- Quick project realization
- Low programming efforts
- One tool for programming, visualizing, documentation
- Compatibility to products of member companies of the CoDeSys Automation Alliance

PROGRAMMING LANGUAGES

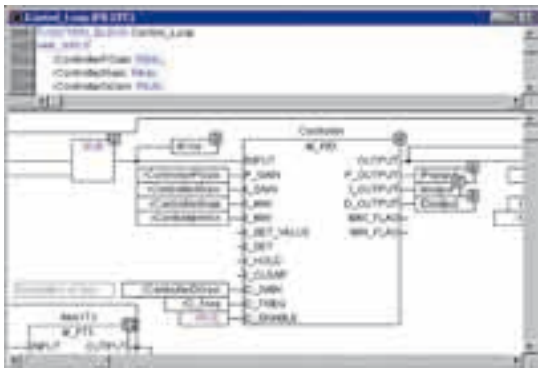
PROGRAM CREATION

- All IEC 61131 programming languages and CFC (Continuous Function Chart)
- Full scope of function in all programming languages, provides maximum flexibility in creation of user programs
- Each module can call other modules regardless of the programming language they have been created in

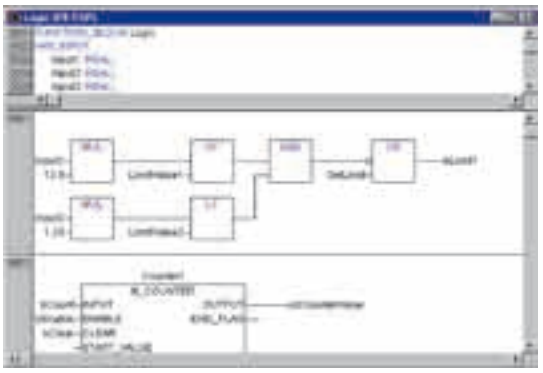
EDITORS

- Context-sensitive input help
- Automatic formatting
- Context menus in all editors
- Syntax coloring
- Multi-level undo/redo
- Display of the current values of all variables in online operation

CONTINUOUS FUNCTION CHART (CFC)



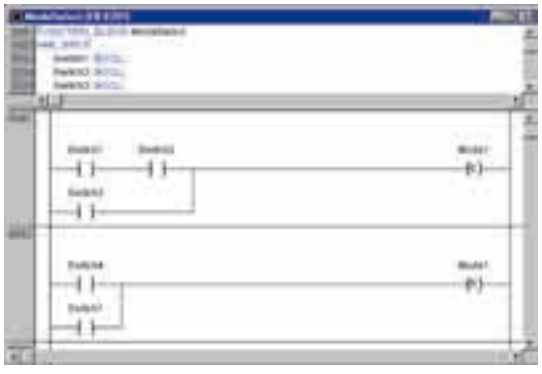
FUNCTION BLOCK DIAGRAM (FBD)



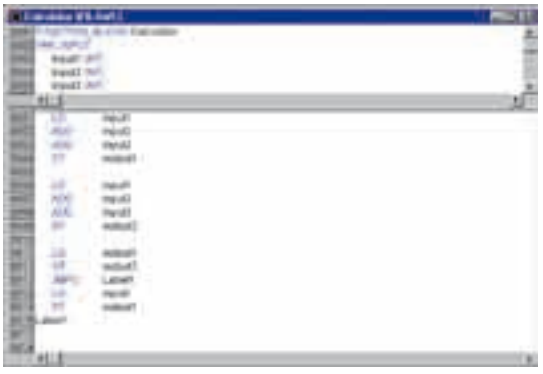
STRUCTURED TEXT (ST)

SEQUENCE FUNCTION CHART (SFC)

LADDER DIAGRAM (LD)



INSTRUCTION LIST (IL)



LIBRARIES

TECHNICAL DATA

MACS is based on CoDeSys which is the most modern IEC 61131 programming system. It has been extended in the areas of control technique and motion control by Moog. In this way, even complex automation projects can be simplified.

Overview: Scope of Function of the Moog Libraries

Regulation and Control Technique
- Controller
  - I, D, PID standard, PID extended
- Filter
  - high-pass, low-pass
- Transmission functions
  - continuous, time discrete
- Non-linear functions
  - dead band, non-linear
  - dual-gain, look-up table
- Simulation of control routes
  - PT1, PT2
- Function generator
- Signal delay
- Counter, timer

PLCopen function blocks
According to the specification "function blocks for motion control" for single and multi-axis applications:
- Absolute and relative positioning
- Speed functions
- Homing
- Cam functions
- Gearbox functions

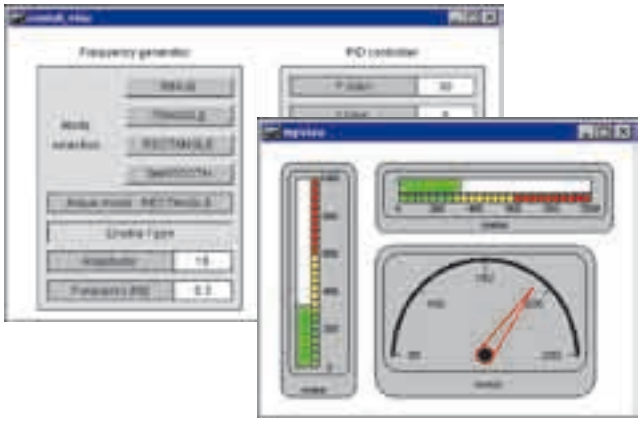
Communication, Ethernet, CAN and TIA/EIA 232
- Initialization
- Transmission and receiving of data

Hardware Related Functions
- Signal conditioning for analog inputs/outputs and position sensor
- Evaluation of status information
- Time evaluation
- Monitoring
  - temperature, watchdog, wire breakage

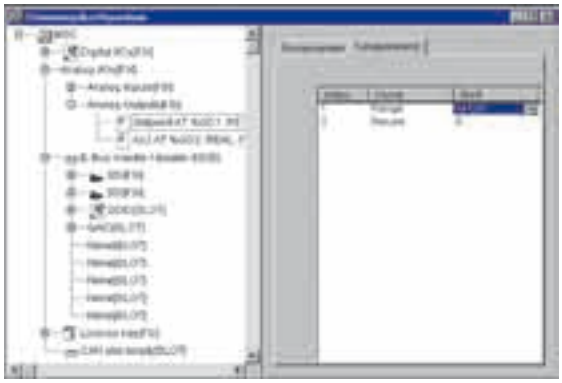
Designation	Description	Order
MACS (Moog Axis Control Software)	Development environment pursuant to IEC 61131 One license per developer	1 license: D138-001-001 10 licenses: D138-001-010
MACS HMI (Human Machine Interface)	Visualization version For full-screen display of visualizations which were created with MACS. Without development environment. One license per machine.	1 license: D138-003-001 10 licenses: D138-003-010
Software maintenance contract	Includes support and updates for 1 year	B95914-001

THE COMPONENTS

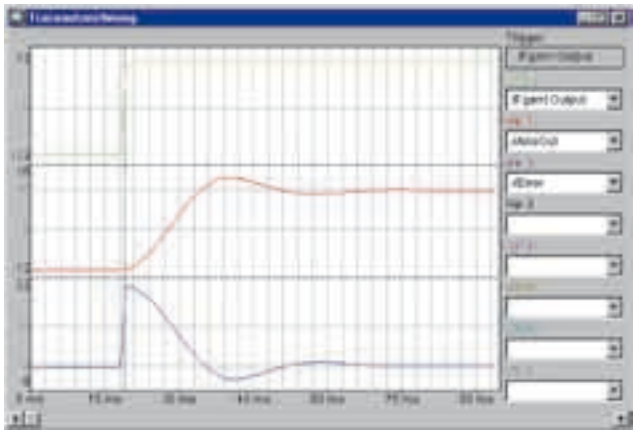
VISUALIZATION
- Commissioning tool
- Creation of visualizations for end users



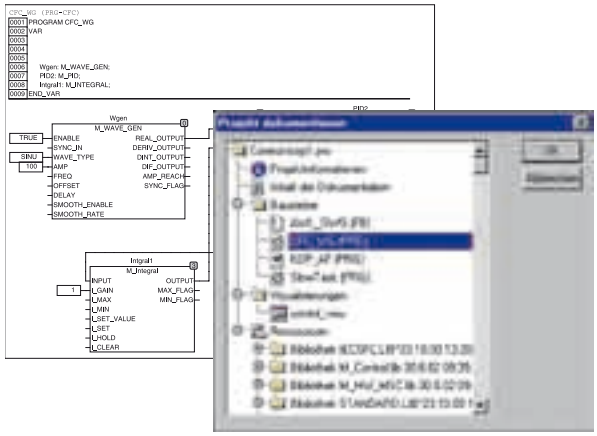
HARDWARE CONFIGURATION
- Configuration of all M3000 modules on one screen



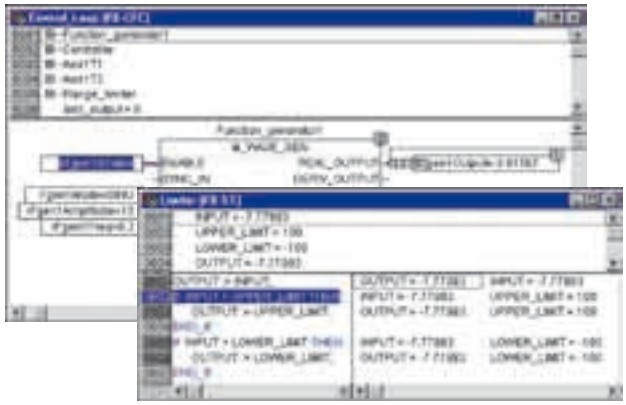
OSCILLOSCOPE
- Recording of up to 20 channels
- Various triggering possibilities



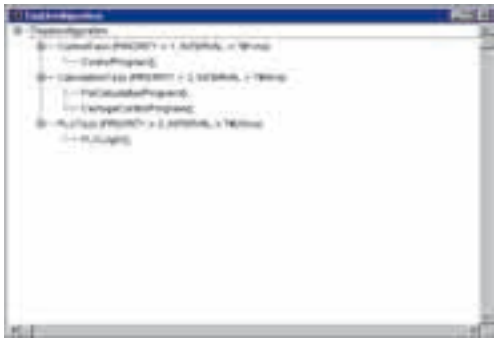
DOCUMENTATION
- Automatic creation of the project documentation with all components



DEBUGGING
- Break points
- Single step/single cycle
- Writing and forcing of variables
- Simulation possible without hardware
- Display of all the current values



TASK CONFIGURATION
- Enables division of the application program into a number of tasks
- Call of the tasks optionally time-based (cyclic) or event triggered
- Priority and time base of each task adjustable



ANALOG MODULE

QAIO 2/2

BRIEF DESCRIPTION

GENERAL

The QAIO 2/2 analog module is used for local extension of the inputs and outputs (I/O) of the Moog Servo Controller MSC or MSC II. The analog levels are identical to the levels of the MSC.
The module is mounted on a DIN top-hat rail and directly connected to an MSC or MSC II via the internal extension bus (E-bus).

FEATURES

Analog I/O extension module with pulse input.
- 2 analog inputs
- 2 analog outputs
- 1 reference voltage output +10 V
- Pulse input
- Connection via E-bus

OUTPUTS/INPUTS

- 2 analog inputs, each configurable in the MACS development environment as ±10 V, ±10 mA or 4-20 mA. The inputs are converted in multiplex operation
- 1 reference voltage output:
  The reference voltage source provides a short circuit protected voltage of +10 V
- 2 analog outputs, each ±10 V, additionally individually configurable in the MACS software as ±10 mA, ±50 mA or 4–20 mA with wire fault monitoring
- 1 pulse input 24 V useable as counter input or frequency measurement input

MODULE STATUS LEDS

On the front, 4 LEDs provide information about the status of important module functions.

CONFIGURATION

The configuration of the analog I/O is carried out per software via the central control configuration in the Moog Axis Control Software (MACS) development environment. Either the two analog inputs or the pulse input can be used.

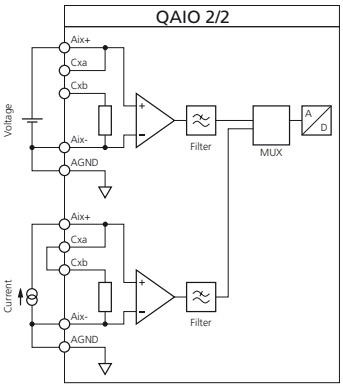
ACTUATION

The I/O of the analog extension module is actuated directly from an MSC or MSC II (not D136X001-001 and D136E001-001) via the extension bus (E-bus). All input- and output-data are transferred within one cycle of the E-bus.

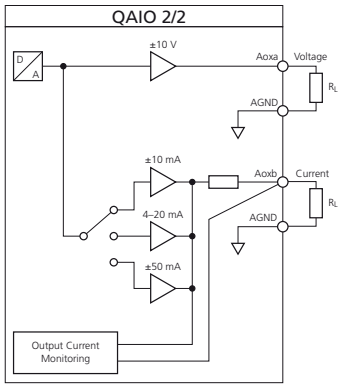
E-BUS

One MSC or MSC II can be extended with a maximum of 7 QAIO 2/2-AV modules. It is not possible to combine it with QAIO 16/4 on one E-bus segment.

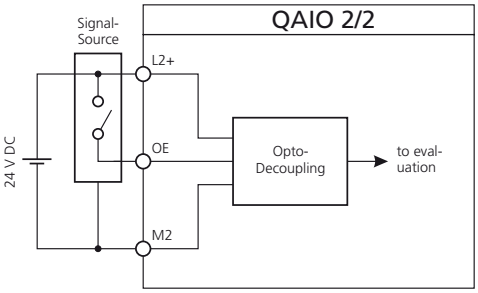
ANALOG INPUT (CURRENT/VOLTAGE)



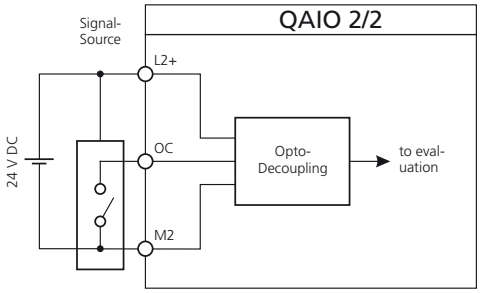
ANALOG OUTPUT (CURRENT/VOLTAGE)



PULSE INPUT POSITIVE SWITCHING



PULSE INPUT GROUND SWITCHING



ANALOG MODULE

QAIO 2/2

TECHNICAL DATA

Module Data	QAIO 2/2-AV I/O extension module
Order number	D137-001-011
Connection to M3000 modules	Via E-Bus (10 MHz); please note: - It is not possible to connect the module to an MSC D136X001-001 or D136E001-001 - Combination with QAIO 16/4 A on one E-bus segment is not possible
Connection technique	Plug-in terminal strips for screwing or clamping
Mounting	Mounting rail NS 35/7.5 pursuant to EN 50022 (DIN top-hat rail)
4 module status LEDs	Module functions and diagnosis
Dimensions, W x H x D	124 x 170 x 85.5 (attachment dimension: W = 113/118.5) mm 4.88 x 6.69 x 3.37 (attachment dimension: W = 4.45/4.67) inch
Temperature range	+5 °C (+41 °F) to +55 °C (+131 °F) (operation) and -25 °C (-13 °F) to +70 °C (+158 °F) (storage) Mean temperature in operation for 24 hrs.: max. +50 °C (+122 °F)
Relative air humidity	10 % to 95 % (non-condensing)
Operation height	Max. 2000 m (6500 ft); storage/transport max. 3000 m (9800 ft)
Standards	
Operating equipment demands and examinations	IEC 61131-2
Interference emission / immunity	EN 61000-6-4 / EN 61000-6-2, industrial part
Shock / vibration	IEC 60068 part 2-27 / IEC 60068 part 2-6
Protection class / protection system	III / IP20
Insulation strength	IEC 61131-2; test voltage 500 V DC
Energy Supply	
Voltage supply of module electronics	24 V DC (18-36 V DC) SELV pursuant to DIN EN 60950-1
Current consumption of module electronics	Max. 0.25 A
Potential separation	Separate potentials for: module electronics, 24 V energy supply, pulse input
Internal voltages	Internally generated via DC/DC converters
Protection against reverse polarity	Yes
Analog Inputs/Outputs	
2 analog inputs	16 Bit; individually configurable in the MACS development environment as ±10 V, ±10 mA or 4–20 mA; overvoltage protection up to ±36 V
2 analog outputs	16 Bit; each ±10 V, additionally individually configurable in the MACS development environment as ±10 mA, ±50 mA or 4–20 mA Overvoltage protection up to ±36 V; short-circuit protected
Reference for sensors	
Reference voltage output	+10 V; max. load: 5 mA Overvoltage protection up to ±36V; short circuit protected
Pulse input	
Pulse input	24 V digital input can be used as input pursuant to IEC 61131-2 type 1 positive switching (input OE) or ground switching (input OC)

Accessories Plug-in terminal strips (two 18-pole and one 9-pole are required per module)

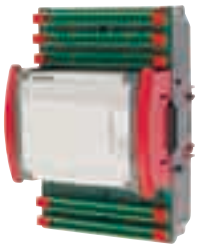
Designation	Description	Order number
Screw terminal 18-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	VK055-018
Screw terminal 9-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	VK055-009
Spring latch clamp 18-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	B95907-018
Spring latch clamp 9-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	B95907-009

Detailed information and integration tips can be obtained from the user manual.

ANALOG MODULE

QAIO 16/4

BRIEF DESCRIPTION



GENERAL

The QAIO 16/4 analog module is used for local extension of the inputs and outputs (I/O) of the Moog Servo Controller MSC or MSC II.

The module is mounted on a DIN top-hat rail and directly connected to an MSC or MSC II via the internal extension bus (E-bus).

FEATURES

Analog I/O extension module

- QAIO 16/4-V 16 voltage inputs ±10 V; or QAIO 16/4-A 16 current inputs ±20 mA
- 4 voltage outputs, ±10 V
- 1 reference voltage output +10 V
- Connection via E-bus

INPUTS/OUTPUTS

- 16 voltage or current inputs:
  The input channels are converted in multiplex operation. The measurement range is ±10 V (QAIO 16/4-V) or ±20 mA (QAIO 16/4-A)

- 1 reference voltage output:
  The reference voltage source provides a short circuit protected voltage of +10 V

- 4 voltage outputs:
  The output channels provide a voltage signal in the range of ±10 V. The maximum output current is 5 mA (overload protection)

CONFIGURATION

The configuration of the analog I/O is carried out per software via the central control configuration in the Moog Axis Control Software (MACS) development environment.

ACTUATION

The I/O of the analog extension module is actuated directly from an MSC or MSC II via the extension bus (E-bus).

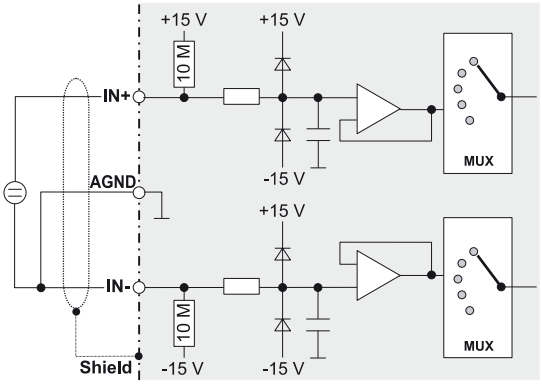
MODULE STATUS LEDS

On the front, 4 LEDs provide information about the status of important module functions.

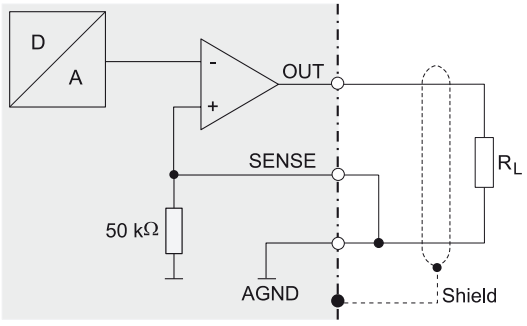
E-BUS

One MSC or MSC II can be extended with a maximum of 7 modules (e.g. QAIO or QDIO).

BASIC CIRCUIT DIAGRAM, ANALOG INPUT



BASIC CIRCUIT DIAGRAM, ANALOG OUTPUT



ANALOG MODULE

QAIO 16/4

TECHNICAL DATA

Module Data	Analog I/O extension module
Order number	QAIO 16/4-V: D137-001-007; QAIO 16/4-A: D137-001-006
Connection to M3000 modules	Via E-bus (5 MHz)
Connection technique	Plug-in terminal strips for screwing or clamping
Connection of the I/O	3-conductor front wiring
Mounting	Mounting rail NS 35/7.5 according to EN 50022 (DIN-top hat rail)
4 module status LEDs	Module functions and diagnosis
Dimensions, W x H x D	124 x 170 x 85.5 (attachment dimension: W = 113 / 118.5) mm; 4.88 x 6.69 x 3.37 (attachment dimension W = 4.45/4.67) inch
Temperature range	+5 °C (+41 °F) to +50 °C (+122 °F) (operation) and -25 °C (-13 °F) to +70 °C (+158 °F) (storage)
Relative air humidity	10 % to 95 % (non-condensing)
Standards	
Interference emission / immunity	EN 61000-6-4 / EN 61000-6-2, industrial portion
Protection class / protection system	III / IP20
Insulation strength	IEC 61131-2; test voltage 500 V DC
Energy Supply	
Voltage supply of module electronics	24 V DC (18-32 V DC) SELV pursuant to DIN EN 60950-1
Current consumption of module electronics	Max. 0.3 A
Voltage supply of the analog I/O	Internally supplied via DC/DC converters
Potential separation	Yes, opto-decoupled towards E-bus; No separation between energy supply and analog channels
Protection against reverse polarity	Yes
Analog Inputs	
16 analog inputs, differential	QAIO 16/4-V: ±10 V; QAIO 16/4-A: ±20 mA
Resolution	12 Bit (multiplex operation)
Input impedance in signal area	QAIO 16/4-V: 10 MΩ; QAIO 16/4-A: 50 Ω
Analog Outputs	
4 analog outputs	±10 V
Resolution	12 Bit
Output current	Max. 5 mA
Load resistance	Min. 2 kΩ
In-phase area	±2 V
Reference Voltage Source	
Reference voltage	+10 V DC sustained short circuit protection
Load current	Max. 5 mA
Precision	0.1 %

Accessories Plug-in terminal strips (5 are required per module)

Designation	Description	Order number
Screw terminal, 18-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	VK055-018
Spring-power clamp, 18-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	B95907-018

Detailed information and integration tips can be obtained from the user manual.

DIGITAL MODULE

QDIO 16/16

BRIEF DESCRIPTION

GENERAL

The QDIO digital module is used for extension of the local inputs and outputs (I/O) of the Moog Servo Controller MSC or MSC II.

The module is mounted on a DIN top-hat rail and directly connected to an MSC or MSC II, or a remote digital I/O module (RDIO) via the internal extension bus (E-bus).

FEATURES

Digital I/O extension module
QDIO 16/16-0.5: I/O positive switching
QDIO 16/16-0.5N: I/O zero switching

- 16 digital inputs 24 V
- 16 digital I/O, 24 V, individually configurable as an input or an output
- Connection via E-bus

CONFIGURATION

The configuration of the digital I/O is carried out per software via the central control configuration in the Moog Axis Control Software (MACS) development environment.

STATUS LEDs

LEDs on the front provide information about the status of the I/O. The arrangement of the LEDs corresponds to the I/O connections.

ACTUATION

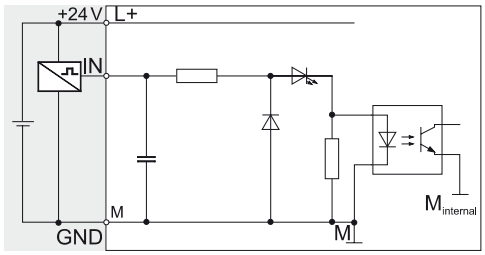
The I/O of the digital extension module are actuated directly from an MSC, MSC II or RDIO via the extension bus (E-bus).

E-BUS

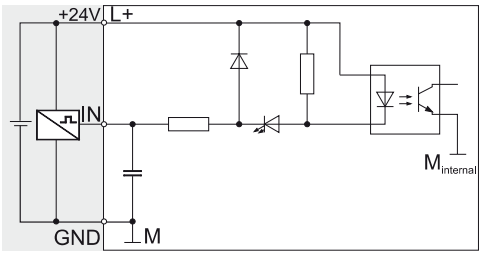
One MSC or MSC II can be extended with a maximum of 7 modules (e.g. QDIO or QAIO). Further digital I/O can be actuated via RDIO modules, which are connected with an MSC or MSC II via CANopen.

BASIC CIRCUIT DIAGRAM, DIGITAL INPUT

Plus switching

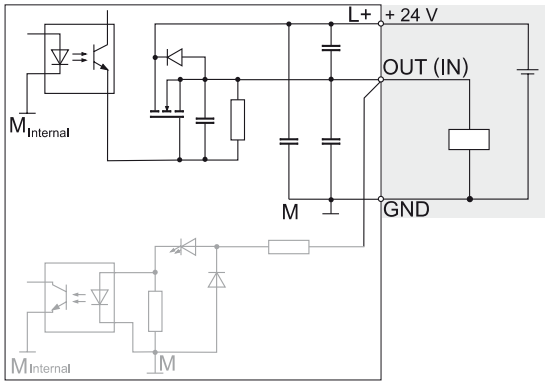


Zero switching

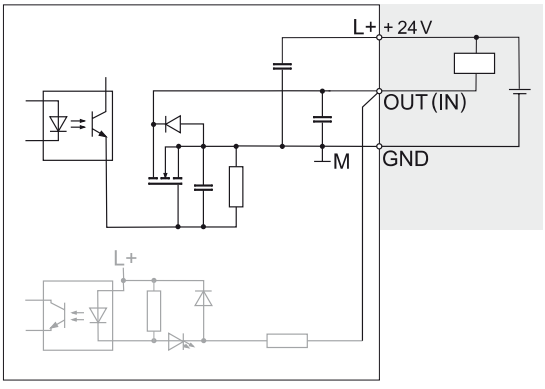


BASIC CIRCUIT DIAGRAM, DIGITAL OUTPUT

Plus switching



Zero switching



DIGITAL REMOTE I/O EXTENSION MODULE

QDIO 16/16

TECHNICAL DATA

Module Data	Digital Remote I/O Extension Module
Order number / Designation	QDIO 16/16-0.5: D137-001-005 QDIO 16/16-0.5N: D137-001-004
Types of inputs/outputs	QDIO 16/16-0.5: plus switching QDIO 16/16-0.5N: zero switching
Connection to M3000 modules	Via E-bus (max. 10 MHz)
Connection technique	Plug-in terminal strips for screwing or clamping
Connection of the I/O	3-conductor front wiring
Assembly	Mounting rail NS 35/7.5 pursuant to EN 50022 (DIN top-hat rail)
Status LEDs	1 Status LED per I/O
Dimensions W x H x D	124 x 170 x 85.5 (attachment dimension: W = 113/118.5) mm; 4.88 x 6.69 x 3.37 (attachment dimension W = 4.45/4.67) inch
Temperature range	+5 °C (+41 °F) to +50 °C (+122 °F) (operation) and -25 °C (-13 °F) to +70 °C (+158 °F) (storage)
Relative air humidity	10 % to 95 % (non-condensing)

Standards	
Interference emission / immunity	EN 61000-6-4 / EN 61000-6-2, industrial portion
Protection class / protection system	III / IP20
Insulation strength	IEC 61131-2; test voltage 500 V DC

Energy Supply	
Voltage supply of module electronics	24 V DC (18-32 V DC) SELV pursuant to DIN EN 60950-1
Current consumption of module electronics	Max. 0.15 A
Voltage supply of the digital I/O	24 V DC (SELV), divided into 6 groups
Current consumption of the digital I/O	At U = +24 V DC in idling, max. 300 mA; all digital I/O active, approx. 8 A
Potential separation	Yes, between E-bus and digital I/O

Digital Inputs/Outputs	
Number of inputs	16
Number of inputs/outputs	16, each useable as inputs or outputs
Output current	Max. 0.5 A
Short-circuit / reverse polarity protection	Yes / yes, all digital outputs

Accessories Plug-in terminal strips (6 are required per module)

Designation	Description	Order number
Screw terminal, 18-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	VK055-018
Spring-power clamp, 18-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	B95907-018

Detailed information and integration tips can be obtained from the user manual.

EXTENSION MODULE

QEBUS-CAN

BRIEF DESCRIPTION

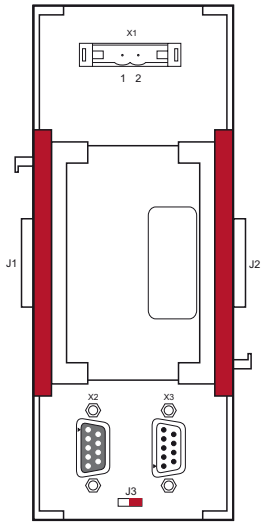
GENERAL

The QEBUS-CAN module is designed for using the LocalCAN bus for external CAN bus nodes.
The LocalCAN bus is integrated in the extension bus plug and is accessed via the QEBUS-CAN module by means of two D-Sub mating connectors.
Furthermore, the QEBUS-CAN module offers the option of using a jumper to connect/disconnect a CAN termination resistor.
The module is mounted onto a DIN top-hat rail and is directly attached to an MSC or MSC II or extension module via the Q-connector.

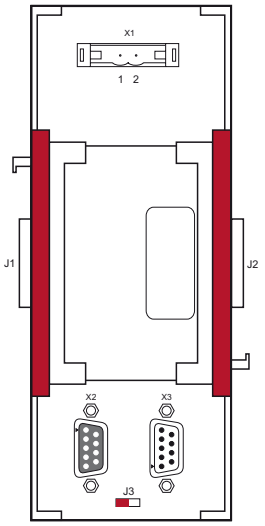
FEATURES

- The QEBUS-CAN module does not count as an E-bus node, it can be used in addition to the maximum number of E-bus modules
- The module can be placed either at the far left or far right in an E-bus segment
- The module has a smaller width than the QDIO, QAIO and RDIO modules
- The module does not need to be configured
- The E-bus does not pass through the module
- Both D-Sub mating connectors are identically wired
- The CAN bus can be connected to a power supply via X1

CONNECTORS



Jumper position
CAN bus not terminated



Jumper position
CAN bus terminated

CONNECTION ASSIGNMENTS

X1 CAN supply connection assignments		
Nr.	**Assignment**	**Connection**
1	CAN_V+	CAN bus supply
2	DGND	Digital ground

Connection assignment LocalCAN X2 and X3		
Nr.	**Assignment**	**Connection**
1		
2	CAN-L	CAN-
3	DGND	Digital ground
4		
5		
6		
7	CAN-H	CAN+
8		
9	CAN_V+	CAN bus supply

Non assigned contacts are not connected.

TECHNICAL DATA

Module Data	QEBUS-CAN Extension Module
Designation	QEBUS-CAN
Order number	D137-001-010
Connection to M3000 modules	Via Q-connector
Connection technology	Optional CAN power supply: plug-in terminal strip for screwing or clamping, CAN bus: 2 D-Sub connections
Installation	Mounting rail NS 35/7.5 according to EN 50022 (DIN top-hat rail)
Dimensions W x Hx D	65 x 170 x 85.5 (attachment dimension W = 59.5) mm 2.55 x 6.69 x 3.37 (attachment dimension W = 2.34) inch
Temperature range	+5 °C (+41 °F) to +55 °C (+131 °F) (operation) and -25 °C (-13 °F) to +70 °C (+158 °F) (storage). Mean temperature during operation over 24 hours: max. 50 °C (+122 °F)
Relative humidity	10% to 95% (non-condensing)
Operating height	Max. 2000 m (6500 feet); storage/transport: max. 3000 m (9800 feet)

Standards	
Operational equipment demands and examinations	IEC 61131-2
Interference emission / immunity	EN 61000-6-4 / EN 6100-6-2, industrial range
Shock / vibration	IEC 60068 Part 2-27 / IEC 60068 Part 2-6
Protection class / protection system	III / IP20
Insulation strength	IEC 61131-2; test voltage 500 V DC

Energy supply	
Voltage supply of module electronics	None (passive module)

Interfaces	
Q-connector	Contains the LocalCAN bus of the MSC ; E-bus is not passed through the module
LocalCAN Bus	2 D-Sub connections (these are connected internally); 120Ω termination resistor can be connected / disconnected with jumper J3

Accessories Plug-in terminal strip (1 piece per module)

Designation	Description	Order number
Screw terminal, 2-pole	Up to max. conductor cross-section of 2.5 mm^2 (14 AWG)	VK055-002
Spring-power clamp, 2-pole	Up to max. conductor cross-section of 2.5 mm^2 (14 AWG)	B95907-002
CAN connection cable, 3 meters / 9.8 feet	One side: 9-pole D-Sub plug-in connector with pin contacts (to DIN 41652) Other side: 9-pole D-Sub plug-in connector with jack contacts (to DIN 41652)	B95863-001
CAN connection cable, 10 meters / 32.8 feet	One side: 9-pole D-Sub plug-in connector with pin contacts (to DIN 41652) Other side: 9-pole D-Sub plug-in connector with jack contacts (to DIN 41652)	B95863-002

Detailed information and integration tips can be obtained from the user manual

DIGITAL REMOTE I/O EXTENSION MODULE

RDIO 16/16

BRIEF DESCRIPTION

GENERAL

The RDIO digital module is used as a remote extension of the local inputs and outputs (I/O) of a Moog Servo Controller MSC or MSC II.
The module is mounted on a DIN top-hat rail and connected to an MSC or MSC II via CAN.

FEATURES

Digital I/O extension module
- 16 digital inputs 24 V
- 16 digital I/O 24 V, individually configurable as an input or an output
- CANopen slave complying with CiA DS 401

INTERFACE

The Moog Axis Control Software (MACS) includes a library with function blocks to interface the RDIO via CANopen. This ensures simple integration into the Moog M3000 control system, e.g. to Moog Servo Controller MSC and MSC II.

CANopen INTERFACE

The I/Os are accessed via CANopen interface.
The RDIO can be extended locally by connecting up to 6 QDIO modules. The I/Os of the QDIO modules are also accessed via CANopen interface of the RDIO.

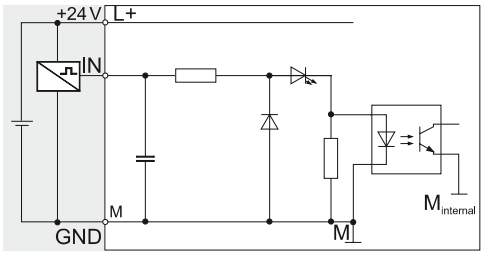
STATUS-LEDs

LEDs on the front provide information about the status of each I/O. The arrangement of the LEDs corresponds to the I/O connections.

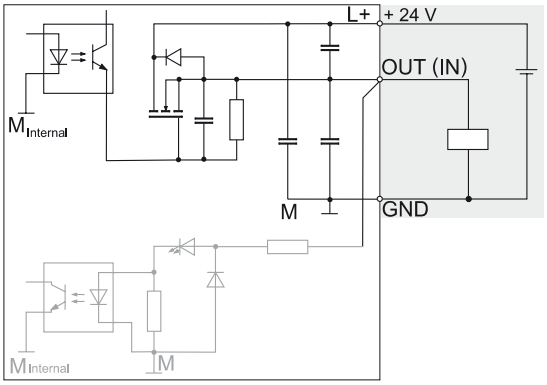
HARDWARE CONFIGURATION

- No modules shall be connected to the left Extension-module-Bus (E-Bus) connector of the module
- The CAN interface is only accessible via the CAN connectors on the front cover
- Up to 6 QDIO modules can be connected to the right E-Bus connector of the module
- Several RDIOs can be connected via CAN connector

BASIC CIRCUIT DIAGRAM, DIGITAL INPUT



BASIC CIRCUIT DIAGRAM, DIGITAL OUTPUT



DIGITAL REMOTE I/O EXTENSION MODULE

RDIO 16/16

TECHNICAL DATA

Module Data	Digital Remote I/O Extension Module
Order number / Designation	D137-002-001 / RDIO 16/16-0.5
Types of inputs/outputs	Plus switching
Interfaces	CAN, E-Bus
Connection technique	Plug-in terminal strips for screwing or clamping
Connection of the I/O	3-conductor front wiring
Assembly	Mounting rail NS 35/7.5 pursuant to EN 50022 (DIN top-hat rail)
Status LEDs	1 Status LED per I/O
Dimensions W x H x D	124 x 170 x 85.5 (attachment dimension: W = 113/118.5) mm 4.88 x 6.69 x 3.37 (attachment dimension: W = 4.45/4.67) inch
Temperature range	Operation: 5 °C to 50 °C (41 °F to 122 °F) Storage: -25 °C to 70 °C (-13 °F to 158 °F)
Relative air humidity	10 % to 95 % (non-condensing)

Standards	
Interference emission / immunity	EN 61000-6-4 / EN 61000-6-2, industrial portion
Protection class / protection system	III / IP20
Insulation strength	IEC 61131-2; test voltage 500 V DC

Energy Supply	
Voltage supply of module electronics	24 V DC (18-32 V DC) SELV pursuant to DIN EN 60950-1
Current consumption of module electronics	Max. 0.15 A
Voltage supply of the digital I/O	24 V DC (SELV), divided into 6 groups
Current consumption of the digital I/O	At U = 24 V DC in idling, max. 300 mA; all digital I/O active, approx. 8 A
Potential separation	Yes, between CAN and digital I/O

Digital Inputs/Outputs	
Number of inputs	16
Number of inputs/outputs	16, each useable as input or output
Output current	Max. 0.5 A
Short-circuit / reverse polarity protection	Yes / yes, all digital outputs

Accessories Connectors (six 18-poled are needed per module)

Designation	Description	Order number
Screw terminal, 18-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	VK055-018
Spring-power clamp, 18-pole	Up to max. conductor cross-section of 2.5 mm² (14 AWG)	B95907-018
CAN connection cable, 3 meters / 9.8 foot	9-pole D-sub plug-in connection; pin contacts to jack contacts	B95863-001
CAN connection cable, 10 meters / 32.8 foot	9-pole D-sub plug-in connection; pin contacts to jack contacts	B95863-002
CAN bus termination resistor 120Ω	9-pole D-sub plug-in connection with jack contacts	B95864-001
CAN bus termination resistor 120Ω with grounding	9-pole D-sub plug-in connection with pin contacts; CAN-GND connected to SL/PE	B95865-001

Detailed information and integration tips can be obtained from the user manual.

OPERATOR PANEL

RDISP 22

BRIEF DESCRIPTION

GENERAL

The operator panel RDISP 22 is designed for supervision and control of machines and processes.
Its main advantage is the easy and fast creation of visualization screens with text and graphical elements and visualization structures.

FEATURES

- LCD-Display to display text and graphics with 240 x 64 points and LED background lighting
- 8 function keys and 8 LEDs for signal display
- Numeric keypad for value input
- 22 keys all together

DISPLAY

The LCD display with graphics capabilities permits optimum graphical display of your visualization solution. Up to 8 x 40, 4 x 20, 2 x 10 characters per page and any combination of these, pictograms and graphical display images in BMP format can be displayed.
Contrast and brightness can be adjusted via the program or keys.

KEYS

The keys are built as push buttons and are covered by a robust foil. They grant a good haptic feedback.

INTERFACES

CAN, CANopen, TIA/EIA 232

IMAGES AND MESSAGES

The RDISP22 offers the display types 'images' and ´messages'. They can be activated independently.

- Images:
  Images are graphical elements (pictograms, BMP files), in which text and variables are displayed both numerically and graphically or as bar charts or as X/Y charts.
  A menu structure out of different images can be defined by the programmer. An image can be selected by an image number or via a menu structure by using keys

- Messages:
  Messages can be inserted into a page in addition as texts with variables. Messages are activated by using the message number

MEMORY

All data (parameters, images and messages) are stored in the maintenance-free flash memory.

INTERFACE

The Moog Axis Control Software (MACS) includes a library with function blocks to interface the RDISP via CANopen. This ensures simple integration into the Moog M3000 control system, e.g. to Moog Servo Controller MSC or MSC II.

LABELING

The function keys can be labeled freely. This is done by using strips of paper and inserting them between the keys and the front cover.

PROGRAMMING

Programming is carried out on the PC via an user friendly editor. Easy operation enables clear and quick implementation. Programming of menus, menu structures, message texts and multi-language display is easy to achieve with the CPRDISP PC editor.

Accessories

Designation	Description	Order number
CPRDISP	PC based editor to build menu pages	D138-006-001
CAN connection cable, 3 meters / 9.8 foot	9-pole D-sub plug-in connection; pin contacts to jack contacts	B95863-001
CAN connection cable, 10 meters / 132.8 foot	9-pole D-sub plug-in connection; pin contacts to jack contacts	B95863-002
CAN bus termination resistor 120Ω	9-pole D-sub plug-in connection with jack contacts	B95864-001
CAN bus termination resistor 120Ω with grounding	9-pole D-sub plug-in connection with pin contacts; CAN-GND connected to SL/PE	B95865-001

RDISP 22

TECHNICAL DATA

Module Data	Operator Panel
Order number / Designation	D137-004-001 / RDISP 22
Housing	Integrated case
Dimensions: W x D x H in mm (in.)	196 x 129 x 53 (7.72 x 5.08 x 2.09 in.) (front with plug)
Mounting hole: W x D in mm (in.)	187 x 120 (7.36 x 4.72 in.)
Temperature range	-10 °C to 60 °C (14 °F to 140 °F)
Relative air humidity	10 % to 95 % (non-condensing)
Standards	
Interference emission / immunity	EN 61000-6-4 / EN 61000-6-2, industrial portion
Protection class / protection system	III / IP65 front side, IP20 rear side
Shock / vibration	IEC 60068 Part 2-27 / IEC 60068 Part 2-6
Energy Supply	
Voltage supply	24 V DC (17-32 V DC) SELV with reverse voltage protection
Current consumption at 24 V DC	500 mA max. depending on display brightness
Fuse	Electronic with automatic reset
Connection of power supply	6-pole AMP crimp connector
Display	
Display	LCD-Supertwist 240 x 64 points; LED background lighting
Number of characters per line max/min	40 / 10
Line height 2-4-8 lines in mm (in.)	14 / 7 / 4 (0.55 / 0.28 / 0.16 in.)
Standard character set	IBM set 2 and Cyrillic, other characters possible
Keys	Push buttons
Number of keys	22 (including numeric keypad)
Key top	Aluminum disc behind polyester cover; secured against vandalism
Rear	Galvanized steel plate with clamping lid
Weight	1.4 kg (3.08 lbs.)
Functions	
Menu structures	Tree structure or other structure
Contrast and brightness	Adjustable using keys and program
Character attributes	Flashing, normal, and inverse display
Programming	With PC and CPRDISP editor
Value entry	Numeric keyboard
Variables	Up to 104 per page, number of pages typically > 700, only limited by memory size
Variable types	Binary, integer, fixed point, bit pattern ... and others
Memory	Flash EEPROM to store texts, images, messages, operating system etc.
Interface to PC Editor (CPRDISP)	CAN or TIA/EIA 232, TIA/EIA 232 recommended as interface to PC
Interface to controller (e.g. MSC, MSC II)	CAN or TIA/EIA 232, CANopen recommended as interface to controller
Interfaces	
CAN	Galvanic insulation, termination switchable with DIP switch, 9-pin D-Sub connector
RS 232	9-pin D-Sub connector

Detailed information and integration tips can be obtained from the user manual.

BRIEF DESCRIPTION

DIALOG CONTROLLER

The display is freely programmable with the Moog Axis Control Software (MACS) development environment. The predefined visualization elements such as buttons, bar graphs, meters, tables and histograms makes it easy to create visualization screens.

FEATURES

- Programmable with MACS/CoDeSys, no additional editor tool required
- TFT technology for brilliant colors
- Fanless operation
- Communication to MSC / MSC II via Ethernet

TECHNICAL DATA

Module Data	TFT Touch Screen Display
Designation	DialogController
Order number	D137-004-004 Display 5.7“, color TFT ¼ VGA resolution, 320 x 240 pixels with touch screen D137-004-005 Display 10.4“, color TFT VGA resolution, 640 x 480 pixels with touch screen D137-004-006 Display 12.1“, color TFT SVGA resolution, 800 x 600 pixels with touch screen
Dimensions: W x D x H in mm (in.)	Dialog Controller 5.7“: 194 x 172 x 52 (7.6 x 6.8 x 2.0 in.) Dialog Controller 10.4“: 360 x 260 x 77 (14.2 x 10.2 x 3.0 in.) Dialog Controller 12.1“: 440 x 300 x 77 (17.3 x 11.8 x 3.0 in.)
Weight	Dialog Controller 5.7“: ca. 1.5 kg (approx. 3.3 lbs.) Dialog Controller 10.4“: ca. 5 kg (approx. 11 lbs.) Dialog Controller 12.1“: ca. 6 kg (approx. 13.2 lbs.)
Temperature range	Operation: 0 °C (32 °F) to 50 °C (112 °F) fanless technology Transport storage: -20 °C (-4 °F) to 70 °C (158 °F)
Relative air humidity	10 % to 95 % (non-condensing)
Operation height	Max. 2000 m (6500 feet); storage/transport max. 3000 m (9800 feet)
Processor	PowerPC Processor, 32 Bit, RISC architecture with floating point unit
Memory	32 MB / 24 MB for application
Retain memory	16 kByte
Real-time clock	Yes, battery buffered
Development environment	MACS 2.x / CoDeSys 2.3
Runtime software	CoDeSys 2.3 with Target-Visualization, real time operating system with multitasking

Standards	
Interference emission / immunity	EN 61000-6-4 / EN 61000-6-2, industrial part
Shock / vibration	IEC 60068 part 2-27 / IEC 60068 part 2-6
Protection class / protection system	III / IP20 (front IP 65)
Insulation strength	IEC 61131-2; test voltage 500 V DC

Energy Supply	
Voltage supply of module electronics	24 V DC (-15/+20%) SELV pursuant to DIN EN 60950-1
Current consumption	1 A typical / 2 A maximum
Potential separation	Yes between CAN bus and I/Os

Interfaces	
Ethernet (100BaseT)	10/100 MBit/s with 8-pole RJ45 connection (recommended as interface to MSC / MSC II)
USB	1 x host USB Rev. 1.1 (on front) 1 x host USB Rev. 1.1 (on rear)
CAN interface	Transmission rate adjustable, 10 kBit/s to 1 MBit/s
Serial port	2 x TIA/EIA 232, 1 x TIA/EIA 485

NOTICE

NOTICE

NOTICE

GLOBAL SUPPORT

As a recognized leader in motion control technologies, Moog offers a full range of services to support our products and ensure that they meet the expectations of customers. Moog experts are the best at helping customers select the right products and ensuring that they run reliably for a long time.

When it is time for new machine commissioning, refurbishment or routine maintenance, our engineers can help to optimize machine performance, minimize downtime and ensure the smooth application of our products.

Known for the ability to customize products for the unique needs of our customers, we are uniquely able to handle customer needs and supply services throughout the life cycle of the product. **Moog Authentic Repair®** is designed to provide the highest quality repair services using original equipment parts, the latest design specifications, and highly trained technicians. This ensures that our repaired products will run as well as when they were new.

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